

General Theme

- In general work in teams combining architects, compiler developers, performance and tools engineers, and application experts
 - Note this extends current research programs to specifically involve system architects

Modeling

- Performance Modeling and Prediction of applications for *future* systems
- Highly automated model extraction and validation
 - By computational scientists
 - New programming models
 - Work with system architects

Performance Projections

- Currently we study the factors which affect performance. Use this insight for performance projections for “new” classes of systems (vector, PIM)
- A state-of-the-art multi-level simulation facility for future computer systems, to be used by architects, system software designers and application scientists.

Benchmarks

- New set of benchmarks for future (and possibly exotic) architectures
 - Needs to be flexible enough to provide meaningful evaluations of yet-to-be-designed, much larger systems
- Integrated benchmark, model extraction and performance projection tool

Measurement

- Performance observability especially on new systems
 - What do we need/like to measure
 - Improve on the amount and quality of performance data current systems provide
- Durable performance repositories

Others

- How can we easily adapt current codes to new architectures
- Cross-cutting architecture design involving teams

Gaps

- Some architecture work is needed to connect the gap between applications experts and performance
- Basic research future system architecture
- Advanced/revolutionary architecture testbeds for system classes such as PIM

Needs

- HPC-Linux (as integrated ‘product’)
 - SMP scalability
 - Process control
 - Timer/Counter/Measurement support
 - Virtual memory and memory allocation issues
 - System area network support
- Modular compiler infrastructure to support tools and performance work
- Advanced scalable techniques for online and offline performance data management and data reduction